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A CURIOUS HUMAN DOCUMENT.

BY DR. LOUIS ROBINSON, AUTHOR OF "WILD TRAITS IN TAME ANIMALS."

IN the days of our grandfathers, Philosophy, now more commonly known as Physical Science, was held guilty of clipping angels' wings, of unravelling rainbows, and generally playing the Vandal among the airy castles of romance.

Latterly, she seems to have mended her ways, and, indeed, seems eager to atone for past mischief; for we often find her employed in weaving entrancing histories, more wonderful than the romances of the poets, out of the most prosaic and unpromising materials. Thus, she will take a spadeful of garden mold, and not only evolve from it a wondrous tale concerning vast floods of molten lava, of mountains which have sunk and vanished, of rivers and oceans long since dry, and of stupendous dragons which once thronged the earth, but, in its tiny, living inhabitants, she shows us "a little people exceeding wise," who have succeeded in solving many social problems which the most civilized governments are still wrestling with in vain.

One effect of this change upon general opinion is that a noteworthy respect has grown up for many things which most of our forefathers regarded as "common or unclean," and which the *literati* of their day deemed too utterly contemptible to occupy a genteel intelligence.

Can you imagine, for instance, a literary magazine, two or three generations ago, publishing a philosophical essay upon corns? However much the editor might declare, in rotund Latin, that he was a man, and hence that nothing relating to man was a matter of indifference to him, he would assuredly have tabooed a discussion on corns—in spite of a poignant, personal interest taken therein by nearly all his readers. To-day, as this article testifies, such matters are no longer treated as beneath our dignity; for we have learned that even the most trifling details of the human frame may prove valuable records of the early history of the race. In fact, as I hope to show in the following pages, every corn is an extremely ancient historical record, which is well worthy of careful examination.

In the standard works on Surgical Pathology, corns are, of course, described in considerable detail; but hitherto little seems to have been written as to their primary cause and origin, and nothing whatever as to their historical significance. They are usually classed among diseases of the skin, and are spoken of as a common cause of lameness; yet, there can be no doubt that, in the first place, they were not only distinctly advantageous possessions, but that their special function was to prevent lameness.

If we would understand how this odd perversion has been brought about, we must, firstly, bear in mind that the period during which man, by completely encasing his feet in hard boots, has become a sort of *amateur ungulate*, is very short indeed compared with the immeasurable epoch during which he wore no foot-covering at all. In those ancient days, also, when every man was a hunter who had to pursue game afoot—and was in danger of starvation if he did not succeed—pedestrianism was of much greater importance in the economy of life than it is now. Secondly, we must remember that little or no change has taken place in man's physical framework since those remote times when he was an absolute savage. Thirdly, Nature's methods of meeting physical emergencies, as applied to man, are appropriate, not to his recent, and, as yet, brief environment of civilization (and boots), but to the state of universal bootlessness which prevailed throughout the long stone ages.

Every one knows nowadays that the integument of the body is composed of two chief layers. The deeper part is called the *dermis,* or true skin, and consists of a fibrous network containing abundant blood-vessels and nerves. This is the part which is formed into leather when a hide is tanned. The thin, superficial layer, the *epidermis,* is of a horny character, and, under the microscope is seen to be built up of little cells, looking something like the bricks in a wall. These are round and soft where they are deep and close to the *dermis,* but they become flatter, drier and harder as they near the outside; and, by and by, having been exposed to the wear and tear on the surface, they peel off, and are replaced by others from below. Now, wherever the skin has to bear an extra amount of friction, these horny cells collect more rapidly than elsewhere, because, if such were not the case, the protective covering would soon be worn through. As long as the wear at such a spot is not very great, the layers of new cells ascending from below are more or less horizontal, like the bricks in a wall. But when friction increases at some particular spot, so that a much greater number of horny cells are required to protect the tender tissues beneath, what is done to meet the emergency? As soon as such a need arises, little folds, or mounds, appear in the region where the new "bricks" are manufactured, which increase the extent of the surface from which these are given off, thus causing a great addition to the output. But in this process, as in all manufacturing processes, an increased output involves both increased material and careful superintendence. Hence, in each of these little undulations upon the vascular *dermis,* there spring up loops of new blood-vessels to convey supplies to the spot, and these are always accompanied by delicate and sensitive nerve-branches, whose duty it is to report progress, and to give orders, as it were, how the work is to be carried on.

The result of such a state of affairs can generally be seen upon the palm of the hand where it is exposed to friction, although here, as a rule, a slightly waved surface avails to produce enough horny scales to meet the loss of tissue caused by manual labor. If you wish to see a good example of small mounds, or *papillae,* which increase the cell-manufacturing area where friction is great, examine the bottom of a dog's paw, and you will find it densely crowded with a mass of horny cones (usually worn away at the apex), each of which is based on a vascular *papilla.*

Now, of course, the superficial wear and tear of the naked human foot is much greater than that of the hand. Hence, one not only finds abundant provision for the manufacture of hard and tough skin all over the sole and toes, but, if any one part of the foot is especially exposed to rub or pressure, little mounds or *papillae* form there like those on the foot of a dog.

As long as man ran barefoot, all went extremely well. If one part of the foot, owing to some personal peculiarity of gait or habit, wore away faster than the rest, and was in danger of becoming abraded, that fact alone caused small *papillae,* filled with active blood-vessels and nerves, to spring up at the threatened spot, so that horny cells were produced in great abundance. Hence, any primitive savage who habitually rubbed one part of his foot in climbing to his rock shelter, was protected from consequent disablement; and if, through some change in his habits, another part became chafed more than the rest, the new need was met in a precisely similar fashion No accumulation of this thickened cuticle took place at such a spot, because it was rasped away by the wear and tear of locomotion just as rapidly as it was formed.

Now, let us see what takes place under modern conditions. As I have said above, civilized man has found it expedient to mimic the ungulate quadrupeds, by encasing his feet in stout coverings somewhat resembling hoofs. Even if these fitted perfectly, the enclosed feet would be subjected to conditions of wear and pressure which they were not constructed to sustain. Unfortunately, like all things constructed by human art, our artificial hoofs share the imperfections of their makers. Under the stimulus of undue local pressure caused by an ill-fitting shoe, certain nerves (forming the intelligence department of the disturbed region) become excited, and send an alarming report to headquarters.

Now, whether the blame rests with the small nerves who send the report, or with the big central department which receives and interprets it, I cannot say; but, in some way or other, a gross blunder is committed, which, both from its nature and from the difficulty one finds in tracing it home, calls to mind certain recent achievements of our controllers of warlike stores. For the sake of our argument on this occasion, let us adopt the usual policy of putting all possible blame upon the lesser officials. What happens in such an event as we are discussing may be put somewhat as follows: From the spot "where the shoe pinches," a message is dispatched along the conducting nerves to the central bureau: "Much friction here. Send help at once or skin will be abraded."

There is no delay in responding to this appeal. Help soon arrives, in the shape of large reinforcements of blood corpuscles, both red and white, and roads are at once made (by the outgrowth of *papillae* containing new blood-vessels) for their approach to the threatened region. Moreover, the intelligence department appoints fresh and zealous local agents, in the shape of sensitive nerve-fibres, to accompany the relief expedition.

But, alas! in spite of all the zeal shown, and all the energy expended, one venerable and obsolete system, and one only, is employed on all occasions when such emergencies have to be met. Vast numbers of wear-resisting cells are manufactured and are piled up around each new *papilla* (something like sandbags encircling a redoubt), and are pushed forward in the direction of the supposed danger. Hence, a rapid accumulation of the cuticle takes place over the spot "where the shoe pinches"; and this being artificially protected from attrition from without, continues to thicken, until it causes a severe aggravation of the pressure upon the tender parts below. The nerves in the advanced *papillae* become acutely aware that matters are going from bad to worse, and send agonized appeals for further relief to headquarters. Our central repair department, still taking it for granted that the chief thing it fears—namely, abrasion of the surface—is taking place in spite of all that has been done, redoubles its former efforts. Fresh supplies are hurried to the front, and the local authorities are instructed to increase the pile of horny cells, at the spot where the pressure is greatest, by every means permitted by the laws of Nature.

As a result, the thickened cuticle over each new *papilla,* instead of being rasped away, as in the case of the barefoot savage, is at first heaped up upon the surface like one of the horny cones covering a dog's paw. But, being unable to get any further in an outward direction, on account of the unyielding boot, it presses inward upon the tender and vascular tissues of the *papilla* itself, and at length penetrates them in the form of an inverted cone of corneous matter. By this time, that slow-moving Autocrat of All the Body whom we call "I," and who, as a rule, knows even less about the workings of his remote frontier departments than does the Czar of Russia himself, finds it impossible to stand the thing any longer; so he removes his boot, and takes the matter in hand (more or less) *secundum artem.* But, whatever he may think or do, and however much he may assert his sovereign rights over his own extremities, he gets no help or countenance whatever from his staff of permanent officials, who obstinately and insolently continue to make believe that their lord is still a wild savage, running barefoot in the woods.

It will now be easy to understand the pathological distinction which surgeons draw between corns and callosities. Corns, they say, are persistent, and tend to grow inward and penetrate the deeper tissues; whereas callosities, such as those on the hands of workmen, grow outward, and readily peel off. But, although the real explanation of this fact is not to be found in the best known works on surgery, the usual treatment recommended for a corn—the scraping or cutting away of the superfluous cuticle, and various means for relieving the spot from pressure—are undoubtedly correct from the historic standpoint.

We may see from this that it will not do blindly to "trust to Nature," in medical and surgical emergencies, until we have succeeded in convincing Nature as to the existence and worth of the appliances of modern civilization. In the case in point, I fear there is no prospect whatever of her changing her methods, unless, during the course of many hundred generations, those with corns should be steadily eliminated as "unfit"; so that, at length, the whole surviving population can wear ill-fitting foot-gear with impunity.

Every one who has used unshod horses or oxen, or who has employed sheep dogs on rough and stony ground, is aware that, in wet seasons, the natural horny coverings of the feet tend to become softened, and to wear away more rapidly than when the weather is dry. Like modern savages living on perishable food, our barefoot forefathers must have been obliged to go a-hunting in all weathers: and, such being the case, they, in common with horses and dogs, needed an especially rapid growth of sole-material during the rainy season. Now, it is demonstrable that Nature has made elaborate provision for this very need in the case of most animals.

A careful examination of numerous stabled horses and indoor dogs has shown that, in spite of their protected state, there is a tendency toward the increased growth of the horny covering of the feet, not only during the more rainy periods of the year, but at any time when a spell of wet weather is impending. What the influence actually is that provokes such profound changes in the circulation and nutrition of the extremities as this process involves, we are not able to determine. Probably, sensitiveness of the nervous system to barometric pressure has something to do with it; but I am inclined to think that many living organisms have quite other means, of which we know nothing, for foretelling the approach of rain. When we take into account the marvellous weather-wisdom displayed by many creatures—notably the apes on the Rock of Gibraltar—which, by their action, show that they are aware of the approach of changes before the barometer or the wind-vane gives the least sign of warning, we must admit that the animal body is, after all, an infinitely more delicate meteorological apparatus than any which has been invented by men of science.

Now, can we, by turning again to our "documents," find any trace of such endowments in ourselves? Are we not all aware, either from individual experience, or from common hearsay, that, when rain is threatened, corns "shoot"? The real meaning of this phenomenon should be plain enough to every one who has followed the preceding arguments. Under normal conditions, increased sensitiveness in any part of the human frame is proof of increased vital activity. It means that the local nerves, which represent the intelligence department, and control nutrition, are especially on the alert. Pain, from whatever cause arising, is invariably a proof of nerve irritation, and is usually the result of tension or pressure. Hence, when corns "shoot" on the approach of damp weather, we owe the sharp, throbbing pain then experienced partly to a sudden increase of activity in the vascular and sensitive *papillae*, and partly to a rapid growth of the cuticle which already presses upon them—the whole being due to the fact that some senile and weather-wise commissary at headquarters, who does not believe in boots, having been appointed several thousand centuries before such things were thought of, is making provision against a rainy day.

LOUIS ROBINSON.